

## PATENT ABSTRACTS OF JAPAN

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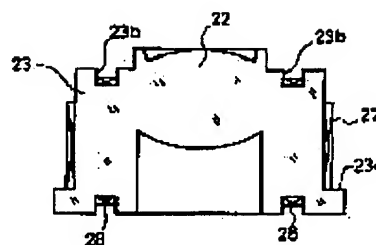
### (54) OPTICAL HEAD DRIVING DEVICE

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To reduce man-hour of soldering, to improve productivity, and to improve quality at the same time by forming a recessed part on the periphery of an object lens for condensing light on a signal record surface of an optical record medium, and winding a driving coil on a part of this objective lens.

**SOLUTION:** Coil winding parts 23a, 23b of a recessed part are formed on the periphery of a lens holder, and a focus coil 27 is wound in the coil winding part 23a so that the coil center part is parallel with the optical axis of the objective lens 22. The focus coil 27 is wound so that it has a predetermined width in the thickness direction of the lens holder. The start part and end part of the focus coil 27 are wound on the holding part and then

individually twisted on a wire, and fixed by soldering, etc. On both sides of the objective lens 22 on the lens holder, tracking coils 28 are wound in the coil winding parts 23b on the wound focus coils 27 so that the coil center part of the tracking coils is orthogonal to the optical axis of the objective lens 22.



### LEGAL STATUS

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**CLAIMS**

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[Claim(s)]

[Claim 1] The optical head driving gear characterized by being the optical head driving gear which enables [ perpendicular and ] horizontally the drive of the objective lens which makes the light beam emitted from the light source condense on the signal recording surface of an optical record medium to the above-mentioned signal recording surface, forming concave heights in the appearance of the above-mentioned objective lens, and looping some above-mentioned objective lenses around a drive coil.

[Claim 2] The optical head driving gear characterized by looping the above-mentioned concave heights around the coil of either the coil for a focal drive, or the coil for a tracking drive directly in an optical head driving gear according to claim 1.

[Claim 3] The optical head driving gear characterized by looping the above-mentioned concave heights around the coil for a focal drive, and the coil for a tracking drive in an optical head driving gear according to claim 1.

[Claim 4] Optical equipment characterized by using an optical head driving gear according to claim 1.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the optical head driving gear used for optical equipments, such as an optical record regenerative apparatus with which the optical pickup which performs record (writing) and/or playback (read) of an information signal using optical record media, such as an optical disk and a magneto-optic disk, is used.

[0002]

[Description of the Prior Art] Conventionally, generally the thing of the structure where the moving part which has an objective lens is shown in drawing 6 of JP,7-225960,A, for example as a 2 shaft actuator of the wire support method which was made to carry out elastic support with four wires is known. The 2 shaft actuator of this drawing 6 is shown as drawing 8 of this application.

[0003] The 2 shaft actuator 1 shown in this drawing 8 is equipped with the base member 6 grade to which the supporter material 5 which supports the end face section of the lens holder 3 which has an objective lens 2, four wires 4 and 4 which carry out elastic support of this lens holder 3, and these four wires 4 and 4, and this supporter material 5 are fixed. The focal coil 7 is wound around the periphery of a lens holder 3 which makes a square so that a coil core may become parallel to the optical axis of an objective lens 2. The tracking coil 8 rolled in the shape of a truck arranges two pieces in each two sides which counter in the direction where four wires 4 of this focal coil 7 extend, and the parallel direction, and is stuck on them, respectively.

[0004] These focus coil 7 and the tracking coil 8 are inserted between the magnet 10 pasted up on the inside of outside York 9 and 9 set up by the base member 6, respectively, and 10. And inner York 11 and 11 which was made to follow each \*\* York 9 and 9, and was prepared is loosely inserted in the through holes 12 and 12 prepared in the lens holder 3. Four wires 4 have the function to connect electrically the printed-circuit board arranged at this lens holder 3, and the printed-circuit board arranged at the base member 6, with the function which supports a lens holder 3.

[0005] For this reason, each point of four wires 4 and the circuit pattern of a holder side printed-circuit board are connected through the lead wire with which both ends are soldered, respectively. Furthermore, the both ends of the focal coil 7 and the tracking coil 8 are soldered to the circuit pattern of this printed-circuit board, respectively, and are connected to it. And an objective lens 2 drives in the direction of a focus, and the direction of tracking according to an operation of the magnetic circuit which magnetic flux generates so that each coil and a right angle may be intersected by supplying a current to the focal coil 7 and the tracking coil 8 through four wires 4.

[0006]

[Problem(s) to be Solved by the Invention] However, in the conventional 2 shaft actuator which was mentioned above, since each coil end of the focal coil 7 and the tracking coil 8 and the point of four wires 4 had become the configuration which it is soldered according to an individual and carries out electrical connection to the printed-circuit board arranged at the lens holder 3 independently, the technical problem that there were many soldering man days and productivity was bad occurred.

[0007] Moreover, although there were some which embed conductors, such as a metal pin, at a lens holder etc., and twist and solder a coil end to this conductor as other conventional 2 shaft actuators, since attached components, such as a conductor, were needed in this case, while the number of components increased and structure became complicated, the technical problem that will cause resonance as conclusion of attached components is inadequate, or other properties would be affected occurred.

[0008] This invention is made in view of this conventional technical problem, and aims at solving the above-mentioned technical problem by carrying out direct continuation of the suspension member, the focal coil, or tracking coil which supports moving part.

[0009]

[Means for Solving the Problem] This invention is an optical head driving gear which enables [ perpendicular and ] horizontally the drive of the objective lens which makes the light beam emitted from the light source condense on the signal recording surface of an optical record medium to the above-mentioned signal recording surface, forms concave heights in the appearance of an objective lens, and loops some above-mentioned objective lenses around a drive coil.

[0010] Moreover, it can constitute so that the above-mentioned concave heights may be directly looped around the coil of either the coil for a focal drive, or the coil for a tracking drive in this configuration.

[0011] Moreover, in this configuration, it can constitute so that the above-mentioned concave heights may be directly looped around the coil for a focal drive, and the coil for a tracking drive. And this invention constitutes optical equipments, such as optical disk equipment, using the optical head driving gear constituted as mentioned above.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 1 - drawing 4 show the example of operation of this invention, and apply only playback (read) of an information signal to the objective lens driving gear as a 2 shaft actuator of the wire support method which uses for a CD player, MD player, etc. as optical equipment which can perform the both sides of record (writing) and playback, and is used for suitable optical pickup using optical record media, such as CD (compact disk) and MD (mini disc). That is, it is the explanatory view showing the important section of the hold section which the perspective view in which drawing 1 - drawing 3 showing the objective lens used for the optical head driving gear of this invention, and showing the objective lens driving gear of the wire support method which drawing 4 requires for the optical head driving gear of this invention, the perspective view which drawing 5 expands the important section of drawing 4 , and is shown, and drawing 6 require for the decomposition perspective view of drawing 1 , and drawing 7 requires for this invention.

[0013] As shown in drawing 4 - drawing 6 , 2 shaft actuator \*\* 21 as an objective lens driving gear is equipped with the base member 26 grade to which the wires 24 and 24 which consist of four metal wires in which one example of the suspension member which carries out elastic support of the lens holder 23 which has an objective lens 22, and this lens holder 23 is shown, the printed-circuit board 25 which supports the end face section of these four wires 24, and this printed-circuit board 25 are fixed. Where an optical axis is turned in the vertical direction, the objective lens 22 is formed in the top-face center section of the lens holder 23 which makes a square at one.

[0014] As the quality of the material of the lens holder 23 containing this objective lens 22, the material for lenses by Japan Synthetic Rubber Co., Ltd. "ARTON (trademark)" is applicable, for example. A principal chain is acrylic resin which makes norbornene structure, and this "ARTON" has light transmission nature, refractivity, thermal resistance, and hygroscopicity, and has the property of bearing also with a high-humidity state.

[0015] As shown in the periphery of this lens holder 23 at drawing 1 - drawing 3 , the coil winding sections 23a and 23b are formed of concave heights, and the focal coil 27 is wound around coil winding section 23a so that a coil core may become parallel to the optical axis of an objective lens 22. This focal coil 27 shows one example of a coil member, and it is wound so that it may become predetermined width of face in the thickness direction of a lens holder 23. After the leader of this focal coil 27 and

trailer 27a are wound around the hold section so that it may mention later, they are wound around a wire 24 and fixed according to an individual by means for detachable, such as soldering, respectively.

[0016] Moreover, the tracking coil 28 is wound around coil winding section 23b from after the focal coil 27 is rolled at the both sides of the objective lens 22 of a lens holder 23, respectively so that the optical axis of an objective lens 22 and a coil core may cross at right angles. This tracking coil 28 shows other examples of a coil member, and it is wound so that it may become predetermined width of face at the longitudinal direction of a lens holder 23. After being wound around the hold section so that the leader of this tracking coil 28 and trailer 28a may be mentioned later similarly, it is wound around a wire 24 and means for detachable, such as soldering, are fixed according to an individual, respectively.

[0017] It is vertical both sides of this lens holder 23, and the hold section 29 for the point of a wire 24 being engaged is formed in longitudinal direction both ends. This hold section 29 consists of three projections 29a, 29b, and 29c arranged at the U shape, and the clearance where a wire 24 is inserted is formed between main projection 29a located inside and two processus accessorius 29b and 29c located outside. Main projection 29a has the head 29a1 prepared at the tip, and the winding section 29a2 which made it thin a little and prepared the level difference rather than this head 29a1, and the leader of the focal coil 27 or the tracking coil 28 or trailer (coil end) 27a (or 28a) is twisted around this winding section 29a2.

[0018] After this coil-end 27a (or 28a) is wound around the winding section 29a2 of main projection 29a several times, it is twisted around a wire 24 several times. And the focal coil 27 or the tracking coil 28, and the wire 24 are electrically connected by [ which show one example of a means for detachable ] taking soldering 30 and joining together. Connection with this coil-end 27a (or 28a) and wire 24 is similarly made by four places corresponding to those numbers. Thereby, the moving part supported with four wires 24 is constituted.

[0019] In addition, as the quality of the material of a wire 24, although phosphor bronze is suitable, of course, other metals can be used, for example. Furthermore, various kinds of ingredients can be used besides a metal like the plastics rod which mixed metal powder with plastics and gave conductivity as a suspension member, for example.

[0020] The other end of such four wires 24 is inserted in the bore of a printed-circuit board 2, and is connected to the circuit pattern with soldering. And the base by the side of the printed-circuit board 2 of each wire 24 is elastically supported through the silicon system gel material 33 by four wire receiving parts 32 prepared in the base member 26, respectively. These wire receiving parts 32 are formed in the U shape, and are aiming at improvement in the controllability ability of a focus servo and a tracking servo in support of the wire 24 on the viscosity of the silicon system gel material 33 held to the interior.

[0021] The base member 26 has frame section 26a formed in the shape of [ square ] a frame, and supporter 26b formed succeeding the 1 side of this frame section 26a, and York 34 and 34 of the pair which countered mutually is formed by carrying out louvering of the inside of frame section 26a, and starting it. In the inside of these York 34, the magnet 35 has fixed by the means for detachable of adhesives etc., respectively. And the moving part which has a configuration which was mentioned above intervenes between these magnets 35 and 35, and the drive of moving part in the direction of an optical axis of an objective lens 22 (the direction of a focus) and the direction (the direction of tracking) which intersects this optical axis is enabled by the current drive of each coils 27 and 28.

[0022] Moreover, two T form sections projected by the both sides of the abbreviation direction are prepared at a time in supporter 26b of the base member 26, and by bending the T form each sections to a U shape, and making them desert up and down, as shown in drawing 3, four wire receiving parts 32 are formed in one. This base member 26 constitutes the fixed part which carries out elastic support of the moving part through four wires 24.

[0023] The optical pickup which has this 2 shaft actuator 21 is constituted by fixing this base member 26 to the slide base which is not illustrated by the means for detachable of a screw etc. By constituting optical equipments, such as a CD player and MD player, using the optical pickup which has this 2 shaft actuator 21, a laser beam is irradiated through the objective lens 22 of the 2 shaft actuator 21 at an optical record medium, an information signal can be recorded on the information recording surface of

this optical record medium, or the information signal currently beforehand recorded on that information recording surface can be reproduced.

[0024] In this way, according to this example, immobilization of the lens holder 23 to a wire 24 and immobilization of the focal coil 27 to a lens holder 23 and the tracking coil 28 can be performed to coincidence using the hold section 29 prepared in the lens holder 23 which has an objective lens 22. Therefore, since positioning of a wire 24 is made by coincidence to a lens holder 23 while being able to simplify the configuration of the 2 shaft actuator 21, the stacked tolerance at the time of assembly can be lessened, and the attachment precision of a wire can be raised. Furthermore, since a wire 24 and coils 27 and 28 are joined directly, by preparing another member, it can lose that attachment backlash arises and generating of resonance resulting from this attachment backlash can be prevented.

[0025] Drawing 4 shows the important section of the 2nd example of this invention, and it enables it to perform immobilization of the wire 24 to a lens holder 23 without being based on soldering. The hold section 39 shown in this 2nd example has member receiving part 39a in which the notch 40 of the shape of a slit in which a wire 24 is inserted loosely was formed, and coil winding section 39b which these notch 40 both sides were made to project to the method of outside, and enabled winding of a coil end. Head 39c which projects to the side is prepared at the tip of coil winding section 39b, and omission of coil-end 27a (or 28a) are prevented by this head 39c.

[0026] After that point is wound around a wire 24 the number of suitable times, it is combined by the means for detachable of soldering 30 grade, and as for coil-end 27a (or 28a) wound around coil winding section 39b of this hold section 39 the number of suitable times, the electric flow is achieved. In drawing 4, a sign 41 is shock absorbing material which carries out elastic support of the wire 24, and can apply the components which have elasticity as this shock absorbing material 41, for example, silicon system gel material.

[0027] Also by considering as such a configuration, the same effectiveness as the above-mentioned example can be acquired. Especially, in this example, since immobilization to the lens holder 23 of this wire 24 can be performed only by inserting a wire 24 in member receiving part 39a with which silicon system gel material was filled up, simplification of a wire fixed means and easy-ization of assembly operation can be attained. And the configuration and dimensional tolerance of this member receiving part 39a can be rough set up by using the shock absorbing material 41 which has elasticity for member receiving part 39a which is the attachment section of a wire 24.

[0028] Although the example which this invention is not limited to the example of the above-mentioned implementation, used four wires as a suspension member in the example of the above-mentioned implementation, and connected each coil end of a focal coil and a tracking coil to the wire, respectively although explained above was explained, if this invention is a configuration which carries out direct continuation of one coil and the two suspension members, it will be realized. Furthermore, the configuration of the component part of lens-holder 23 or base member 26 and others, structure, etc. are not limited to the thing of the example mentioned above.

[0029] Moreover, in the above-mentioned example, although the example which formed the hold sections 29 and 39 in the lens holder 23 at one was explained, it can also consider as the configuration which forms a pin, a screw, etc. by another member, implants this in a lens holder 23 and forms the hold section. As an ingredient of this another member, you may be plastics which was mentioned above, and may be a metal. Furthermore, although the above-mentioned example explained that by which the objective lens 22 and the lens holder 23 were formed in one, it can also consider as the configuration which supports only an objective lens by two or more suspension members. Furthermore, it changes into soldering stated in the above-mentioned example again, and various kinds of junction means, such as junction by soldering or the adhesives which has conductivity, can be applied. Thus, this invention can be variously changed in the range which does not deviate from the meaning.

[0030]

[Effect of the Invention] As mentioned above, since the optical head driving gear by this invention was constituted so that the appearance of an objective lens might be looped around a drive coil, component parts are reduced, a configuration is simplified and reduction-ization of cost is attained. Moreover,

dependability improves, without losing the optical strain generated with the conventional adhesives, and the fault by the mistake of handling of adhesives arising, since-izing of the objective lens can be carried out [-less \*\*\*\* ].

[0031] And there is nothing with [ for attaching an objective lens in a lens holder ] backlash, a gap of an optical axis decreases, and exposure condensing of the light beam can be carried out correctly at a predetermined recording surface.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the top view of the objective lens part applied to this invention.

[Drawing 2] It is the front view of the objective lens part shown in drawing 1 .

[Drawing 3] It is the sectional view of the objective lens part shown in drawing 1 .

[Drawing 4] It is the perspective view showing the example of operation of the 1st of the objective lens driving gear of this invention.

[Drawing 5] It is the perspective view expanding and showing the important section of the objective lens driving gear shown in drawing 1 .

[Drawing 6] It is the decomposition perspective view of the objective lens driving gear shown in drawing 1 .

[Drawing 7] It is the perspective view showing other examples of the hold section concerning the objective lens driving gear of this invention.

[Drawing 8] It is the perspective view showing the conventional 2 shaft actuator.

[Description of Notations]

21 [ .. A wire (suspension member) 26 / .. A base member, 27 / .. A focal coil, 28 / .. 29 A tracking coil, 39 / .. The hold section, 29a / .. A main projection, 30 / .. Soldering, 39a / .. A member receiving part, 39b / .. The coil winding section, 41 / .. Shock absorbing material ] .... A 2 shaft actuator, 22 .. An objective lens, 23 .. A lens holder, 24

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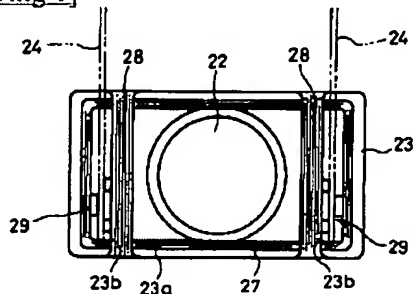
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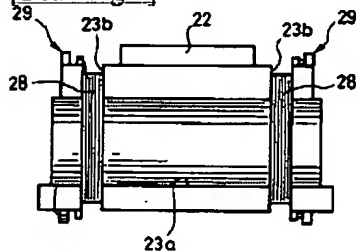
DRAWINGS

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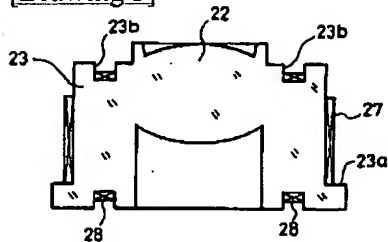
[Drawing 1]



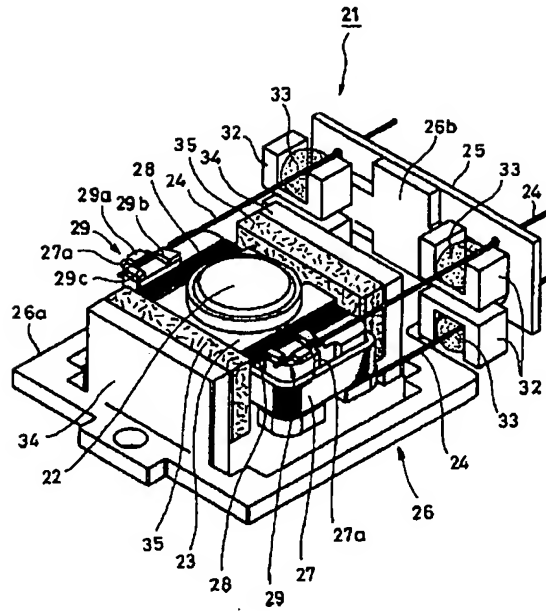
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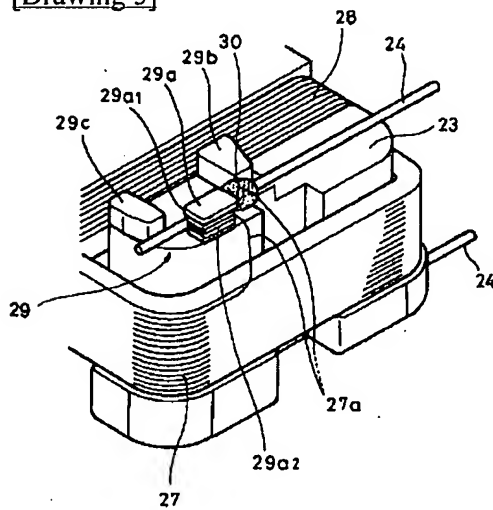
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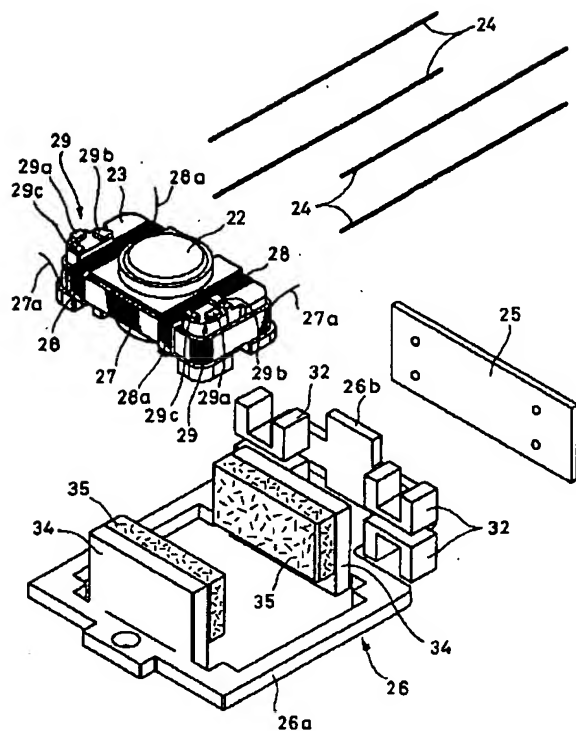
[Drawing 4]



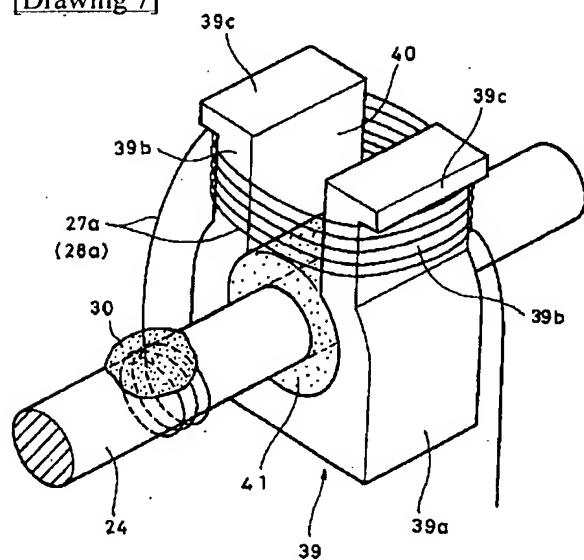
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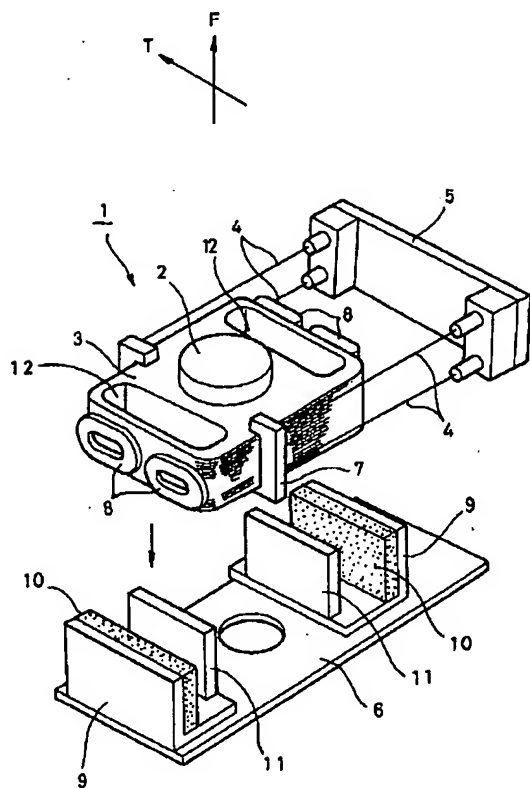
[Drawing 6]



[Drawing 7]



[Drawing 8]



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